the systems gains back to standby. Control goes to block **470** to determine status before returning to the caller.

TESTING FOR CARTRIDGE PRESENT

FIG. **17** is a flowchart of the process of testing for media in a cell. After entry, block **480** positions the transport in front of the cell. Block **482** then sets the control system gains for a plunge operation. Block **484** calls move axes to move the engaging mechanism to a point just in front of the cartridge, then block **486** calls saturate axes to move the engaging mechanism until N pounds of force are encountered, or until the engaging mechanism has moved far enough into the cell for a cartridge to have been encountered (see table 1 for N and distance) Block **488** tests the return status from saturate axes and if the force was encountered, control goes to block **490** to set a flag indicating a cartridge is present in the cell. Block **492** then calls move axes to move the engaging mechanism out to pull the cartridge into the transport, thus arming the fingers. Block **494** then calls move axes to put the cartridge back into the cell. If no cartridge was found, or after the cartridge has been replaced in the cell, block **496** moves the engaging mechanism back to the rest position to re-arm the fingers. Block **498** then sets the control systems gains to standby before control returns to the caller.

FIG. **18** is a flowchart for testing the optical drive for a cartridge. After entry, block **500** positions the transport in front of the optical drive. Block **502** then calls the grab module (FIG. **12**) to eject the cartridge into the transport, if a cartridge is present. Block **504** calls move axes to move the transport to a test area, which does not allow cartridge insertion. Block **506** sets the control system for a plunge operation, and block **508** calls saturate axes to move the engaging mechanism forward until a force of N pounds is encountered (see table 1 for N and distance) or a target position is reached. If the correct force is found, block **510** transfers to block **511** to set a flag indicating that the drive was full. After indicating that the drive was full, or if the correct force was not encountered, control goes to block **512** where move axes is called to move the engaging mechanism back to pull the cartridge into the transport. Block **514** then sets the control system gains to standby. Block **516** tests the drive full flag. If the drive was full, and a cartridge is in the transport, control goes to block **518** to replace the cartridge in the drive before returning to the caller, otherwise control returns directly to the caller.

FIG. **19** is a flowchart of a process to test the transport to determine if a cartridge is present. After entry, block **520** moves the transport to the test area. Block **522** sets the control system gains for a plunge operation, and block **524** calls saturate axes to move the engaging mechanism to a target position, or until a force of N pounds is encountered (see table 1 for N and distance). If the correct force is encountered, block **526** transfers to block **528** to set a flag indicating that the transport is full. After indicating that the transport is full, or the correct force was not encountered, control transfers to block **530** where move axes is called to move the engaging mechanism back to the rest position. Then block **532** sets the control system gains to standby, and control returns to the caller.

MAILSLOT OPERATIONS

FIG. **20** is a flowchart of the operation of rotating the mailslot in to a position that allows the transport to retrieve a cartridge from the mailslot. As described earlier, the mailslot is designed to allow a human operator to insert a cartridge conveniently. Because of the orientation of the cells, operator convenience requires that the cartridge be inserted into the mailslot in a position that is rotated 180 degrees about the vertical axis from the position of a cartridge in a cell. Therefore, the control systems must rotate the insertion mechanism of the mailslot 180 degrees before retrieving the inserted cartridge, and when ejecting a cartridge, the insertion mechanism must also be rotated 180 degrees before the cartridge can be removed by the operator. This rotation is done by aligning a nut on the engaging mechanism with a projection on the insertion mechanism, then moving the engaging mechanism in or out to cause the desired rotation. The nut is aligned on one side of the projection for rotation inward, and on the other side of the projection for rotation outward.

Referring now to FIG. **20**, after entry, block **540** moves the transport into a position that aligns a nut on the engaging mechanism to a position that will allow further alignment of the nut on the side of the insertion mechanism projection that allows for rotation backward. Block **542** completes the alignment by moving the transport mechanism into alignment with the mailslot insertion mechanism projection. Block **546** sets the control system gains for a plunge operation. Block **548** calls saturate axes to move the engaging mechanism backward, thus rotating the insertion mechanism inward. Block **550** checks the force encountered during the movement. If the force exceeded N pounds (see table 1, ROTATE IN JAM for N and distance), then too much opposition was encountered, and the mailslot is probably jammed, so control transfers to block **552** which calls move axes to realign the nut with the outside of the projection. Block **554** then calls move axes to move the insertion mechanism back to its original position before block **556** sets a flag to indicate that the mailslot is jammed.

If block **550** found that the insertion mechanism and the engaging mechanism successfully moved to the position requested, control transfers to block **558** which calls move axes to rotate the insertion mechanism most of the way backward. Then block **560** calls saturate axes to complete the rotation by moving until a force of N pounds is encountered (see table 1, ROTATE IN/OUT COMPLETED for N and distance). Block **562** checks the status from the saturate axes operation and if the force was encountered, control goes to block **564** to set the success flag. If the force was not encountered, control goes to block **566** to indicate that the rotate was not successful. In either case control goes to block **568** to call move axes to move the engaging mechanism to disengage the nut from the projection on the insertion mechanism. Block **570** then sets the control system gains to standby before returning control to the caller.

FIG. **21** is a flowchart of the rotate out operation, where a cartridge is presented to the operator for removal. Referring now to FIG. **21**, after entry, block **580** calls move axes to move the nut into a position that will allow alignment with the insertion mechanism projection on the side for rotating forward. Block **582** then moves the transport into alignment with the projection, then block **584** sets the control system gains for a plunge operation. Block **586** calls move axes to move the engaging mechanism to rotate the insertion mechanism through most of the cycle. Then block **588** calls saturate axes to complete the rotation by moving the engaging